Planetary Protection Requirements for Mars Orbiters

Mars Scout-11 Kick-Off Meeting

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NASA PP Policy

NPD 8020.7F

POLICY

The conduct of scientific investigations of possible extraterrestrial life forms,precursors, and remnants must not be jeopardized. In addition, the Earth must be protected from the potential hazard posed by extraterrestrial sources. Therefore, for certain space-mission/target-planet combinations, controls on organic and biological contamination carried by spacecraft shall be imposed in accordance with directives implementing this policy.

RESPONSIBILITY

A. The Associate Administrator for the Science Mission Directorate, or designee,is responsible for overall administration of NASA's planetary protection policy. This includes the following:

(1) Maintaining the required activities in support of the planetary protection policy at NASA Headquarters.

(2) Assuring that the research and technology activities required to implement the planetary protection policy are conducted.

(3) Monitoring space flight missions as necessary to meet the requirements for planetary protection certification.

PP Policy (cont'd)

B. The designee for managing and implementing this policy is the **Planetary Protection Officer**, who is responsible for the following:

(1) Prescribing standards, procedures, and guidelines applicable to all NASA organizations, programs, and activities to achieve the policy objectives of this directive.

(2) Certifying to the Associate Administrator for Space Science and to the Administrator prior to launch; and (in the case of returning spacecraft) prior to the return phase of the mission, prior to the Earth entry, and again prior to approved release of returned materials, that –

(a) All measures have been taken to assure meeting NASA policy objectives as established in this directive and all implementing procedures and guidelines.

(b) the recommendations, as appropriate, of relevant regulatory agencies with respect to planetary protection have been considered, and pertinent statutory requirements have been fulfilled.

(c) The international obligations assessed by the Office of the General Counsel and the Office of External Relations have been met, and international implications have been considered.

(3) Conducting reviews, inspections, and evaluations of plans, facilities, equipment, personnel, procedures, and practices of NASA organizational elements and NASA contractors, as applicable, to discharge the requirements of this directive.

(4) Keeping the Associate Administrator for the Science Mission Directorate informed of developments policies, procedures, and guidelines.

PP Policy Implementing Documents

NPR 8020.12C

"Planetary Protection Provisions for Robotic Extraterrestrial missions"

- » Defines PP mission categories
- » Details Planetary Protection requirements
- » Establishes schedules for documentation and reviews
- » Includes Planetary Protection parameter specifications

NPR 5340.1C

"NASA standard procedures for the microbial examination of space hardware"

- » Defines procedures for the microbiological examination of space hardware and associated environments.

PP Mission Categories

A	Not of direct interest for understanding the process of chemical evolution. No protection of such planets is warranted (no requirements)	Any	I
B	Of significant interest relative to the process of chemical evolution, but only a remote chance that contamination by spacecraft could jeopardize future exploration.	Any	II
C	Of significant interest relative to the process of chemical evolution and/or the origin of life or for which scientific opinion provides a significant chance of contamination which could jeopardize a future biological experiment.	Flyby, Orbiter	III
		Lander, Probe	IV
All	Any Solar System Body	Earth Return	V

PP Requirements for Mars Orbiters

Category III.

Mars orbiters will not be required to meet orbital lifetime requirements* if they achieve bioburden levels equivalent to the Viking lander pre-sterilization total bioburden**.

**Defined as 20 years after launch at greater than or equal to 99% probability, and 50 years after launch at greater than or equal to 95% probability.*

***Defined as $5x10^5$ total spores (includes surface, mated, and encapsulated bioburden)*

Other PP Requirements for Mars Orbiters

Certification of Category III mission

Documentation

- Planetary Protection Plan
- Prelaunch Planetary Protection Report
- Postlaunch Planetary Protection Report
- End-of-Mission Report

Implementing Procedures (as required)

- Trajectory biasing
- Clean room assembly
- Microbial reduction or orbital lifetime (Mars)